

**Claims**

1. A method of inter-area rekeying of encryption keys in secure mobile multicast communications, in which a Domain Group Controller Key Server (Domain GCKS) distributes Traffic Encryption Keys (TEK) to a plurality of local Group Controller Key Servers (local GCKS) serving respective group key management areas, and said local Group Controller Key Servers forward said Traffic Encryption Keys, encrypted using Key Encryption Keys (KEK<sub>i</sub>, KEK<sub>j</sub>) that are specific to the respective local Group Controller Key Server (local GCKS<sub>i</sub>, GCKS<sub>j</sub>), to group members situated in the respective group key management areas, said local Group Controller Key Servers (GCKS<sub>i</sub>, GCKS<sub>j</sub>) constituting Extra Key Owner Lists (EKOL<sub>i</sub>, EKOL<sub>j</sub>) for said group key management areas (area<sub>i</sub>, area<sub>j</sub>) that distinguish group members (MM<sub>i</sub>, MM<sub>j</sub>) possessing Key Encryption Keys (KEK<sub>i</sub>, KEK<sub>j</sub>) and situated in the corresponding group key management area (area<sub>i</sub>, area<sub>j</sub>) from group members (MM<sub>ij</sub>) possessing Key Encryption Keys (KEK<sub>i</sub>) that were situated in the corresponding group key management area (area<sub>i</sub>) but are visiting another area (area<sub>j</sub>),  
  
characterised in that said local Group Controller Key Servers forward said Traffic Encryption Keys (TEK) to group members (MM<sub>ij</sub>) visiting the respective group key management areas (area<sub>j</sub>) encrypted using a Visitor Encryption Key (VEK<sub>j</sub>) that is specific to the respective local Group Controller Key Server (GCKS<sub>j</sub>) and is different from said Key Encryption Key (KEK<sub>j</sub>).
2. A method as claimed in claim 1, and comprising rekeying said Traffic Encryption Keys (TEK) after rekeying said Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>).

3. A method as claimed in claim 1 or 2, wherein said local Group Controller Key Servers (GCKS<sub>i</sub>, GCKS<sub>j</sub>) rekey a Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) by a process including sending a new Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) to  
5 current group members encrypted using the current Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) and to visiting group members using the Visitor Encryption Key (VEK<sub>i</sub>, VEK<sub>j</sub>).
4. A method as claimed in claim 1 or 2, wherein said local Group Controller Key Server GCKS<sub>i</sub> sends the Visitor Encryption Key (VEK<sub>i</sub>) rather than the  
10 Key Encryption Key (KEK<sub>i</sub>) to new members joining the group via area<sub>i</sub>.
5. A method as claimed in claim 3, wherein said local Group Controller Key Server (GCKS<sub>i</sub>, GCKS<sub>j</sub>) rekey a Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) by a process including sending said new Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) selectively to existing group members situated in the corresponding group  
15 key management area (area<sub>i</sub>, area<sub>j</sub>).
6. A method as claimed in claim 3 or 5, wherein said local Group Controller Key Servers (GCKS<sub>i</sub>, GCKS<sub>j</sub>) rekey a Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) by a process including sending said new Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) to  
20 existing group members using multicast messages and to visiting group members over a different secure channel.
7. A method as claimed in any of claims 3 to 6, wherein rekeying a Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) comprises said local Group Controller Key Servers (GCKS<sub>i</sub>, GCKS<sub>j</sub>) sending a new Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>) selectively to current group members currently situated in the  
25 corresponding group key management areas (area<sub>i</sub>, area<sub>j</sub>).

8. A method as claimed in any preceding claim and including said local Group Controller Key Servers (GCKS<sub>i</sub>, GCKS<sub>j</sub>) constituting Visitor Key Owner Lists (VKOL<sub>i</sub>, VKOL<sub>j</sub>) for said group key management areas (area<sub>i</sub>, area<sub>j</sub>) that distinguish group members (MM<sub>i</sub>, MM<sub>j</sub>) possessing Visitor Encryption Keys (VEK<sub>i</sub>, VEK<sub>j</sub>) and situated in the corresponding group key management area (area<sub>i</sub>, area<sub>j</sub>) from group members (MM<sub>ij</sub>) possessing Visitor Encryption Keys (VEK<sub>i</sub>) that were situated in the corresponding group key management area (area<sub>i</sub>) but are visiting another area (area<sub>j</sub>).
9. A method as claimed in claim 8 wherein said Extra Key Owner Lists (EKOL<sub>i</sub>, EKOL<sub>j</sub>) and said Visitor Key Owner Lists (VKOL<sub>i</sub>, VKOL<sub>j</sub>) comprise lists of the group members (MM<sub>ij</sub>) possessing Key Encryption Keys (KEK<sub>i</sub>), respectively Visitor Encryption Keys (VEK<sub>i</sub>, VEK<sub>j</sub>), that were situated in the corresponding group key management area (area<sub>i</sub>) but are visiting another area (area<sub>j</sub>).
10. A method as claimed in any preceding claim, wherein a group member (MM<sub>ij</sub>) that was visiting another group key management area (area<sub>j</sub>) returns to an area (area<sub>i</sub>) for which it possesses a corresponding Key Encryption Key (KEK<sub>i</sub>) or Visitor Encryption Key (VEK<sub>i</sub>) before expiry of a validity period set by the corresponding Group Controller Key Server (GCKS<sub>i</sub>) without said corresponding Group Controller Key Server (GCKS<sub>i</sub>) rekeying said Key Encryption Key (KEK<sub>i</sub>).

## AMENDED CLAIMS

[received by the International Bureau on 07 November 2005 (07.11.2005): original claim 1- has been replaced by amended claim 1].

1. A method of inter-area rekeying of encryption keys in secure mobile multicast communications, in which a Domain Group Controller Key Server (Domain GCKS) distributes Traffic Encryption Keys (TEK) to a plurality of local  
5 Group Controller Key Servers (local GCKS) serving respective group key management areas, and said local Group Controller Key Servers forward said Traffic Encryption Keys, encrypted using Key Encryption Keys (KEK<sub>i</sub>, KEK<sub>j</sub>) that are specific to the respective local Group Controller Key Server (local GCKS<sub>i</sub>, GCKS<sub>j</sub>), to group members situated in the respective group key  
10 management areas, said local Group Controller Key Servers (GCKS<sub>j</sub>, GCKS<sub>j</sub>) constituting Extra Key Owner Lists (EKOL<sub>j</sub>, EKOL<sub>j</sub>) for said group key management areas (area<sub>j</sub>, area<sub>j</sub>) that distinguish group members (MM<sub>i</sub>, MM<sub>j</sub>) possessing Key Encryption Keys (KEK<sub>j</sub>, KEK<sub>j</sub>) and situated in the corresponding group key management area (area<sub>s</sub>, area<sub>j</sub>) from group members  
15 (MM<sub>y</sub>) possessing Key Encryption Keys (KEK<sub>j</sub>) that were situated in the corresponding group key management area (area<sub>j</sub>) but are visiting another area (area<sub>1</sub>),  
  
characterised in that said local Group Controller Key Servers a) forward said Traffic Encryption Keys (TEK) to group members (MM<sub>j</sub>) visiting the  
20 respective group key management areas (area<sub>j</sub>) encrypted using a Visitor Encryption Key (VEK<sub>j</sub>) that is specific to the respective local Group Controller Key Server (GCKS<sub>j</sub>) and is different from said Key Encryption Key (KEK<sub>j</sub>) and b) send a new Visitor Encryption Key (VEK<sub>j</sub>) to a visiting group member (MM<sub>j</sub>) arriving in the corresponding group key management area  
25 (area<sub>j</sub>) if there is no other visiting group member (MM<sub>j</sub>) situated in the corresponding group key management area (area<sub>j</sub>) and if a current Visitor Encryption Key (VEK<sub>j</sub>) exists that has already been used to encrypt a previous Traffic Encryption Key (TEK).
2. A method as claimed in claim 1, and comprising rekeying said Traffic  
30 Encryption Keys (TEK) after rekeying said Key Encryption Key (KEK<sub>i</sub>, KEK<sub>j</sub>).